

WHAT IS CLAIMED IS:

1. A low heat-generating temperature compensation device that allows an optical communication device to have a constant temperature characteristic regardless of change of environmental temperature, the low heat-generating temperature compensation device comprising:

a temperature sensor that detects a temperature at which the optical communication device is used;

a temperature comparison unit that performs digital signal processing of a signal corresponding to the detected temperature and a signal corresponding to a reference temperature of the optical communication device and then generates a digital error value which represents the difference between the two signals;

a D/A converter that converts the digital error value of the temperature comparison unit into an analog signal;

a temperature control unit that controls the temperature of the optical communication device on the basis of a temperature compensation signal; and

an analog PID control unit that receives the analog signal and performs PID control using an analog method to generate the temperature compensation signal so as to urge the digital error value to zero.

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2. The low heat-generating temperature compensation device according claim 1, wherein said two signals each comprise a voltage signal.

3. The low heat-generating temperature compensation device according claim 1, further comprising a high electric current drive unit for receiving the temperature compensation signal from the analog PID control unit, amplifying the temperature compensation signal and supplying the temperature compensation signal as a high electric
5 current to the temperature control unit.

4. The low heat-generating temperature compensation device according to claim 3, wherein the high electric current drive unit consists of a pulse width modulation driver and a current rectifier.
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5. A low heat-generating temperature compensation device that allows an optical communication device to have a constant temperature characteristic regardless of change of environmental temperature, the low heat-generating temperature compensation device comprising:

15 a temperature sensor that detects a temperature at which the optical communication device is used;

a temperature comparison unit that generates an error value which represents the difference between a signal corresponding to the detected temperature and a signal corresponding to a reference temperature of the optical communication device;

20 an A/D converter that converts the error value of the temperature comparison unit into a digital error value;

a temperature control unit which controls the temperature of the optical

communication device on the basis of an analog temperature compensation signal;

a D/A converter that converts a digital temperature compensation signal into the analog temperature compensation signal; and

a digital PID control unit that performs PID control using a digital method to
 5 generate the digital temperature compensation signal in such a way that the digital error value is urged to zero.

6. The low heat-generating temperature compensation device according claim 5, wherein said two signals each comprise a voltage signal.

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7. The low heat-generating temperature compensation device according claim 5, further comprising a high electric current drive unit for receiving the analog temperature compensation signal from the D/A converter, amplifying the temperature compensation signal and supplying the analog temperature compensation signal as high electric current to
 15 the temperature control unit.

8. The low heat-generating temperature compensation device according to claim 7, wherein the high electric current drive unit consists of a pulse width modulation driver and a current rectifier.

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9. A low heat-generating temperature compensation device, which allows an optical communication device to have a constant temperature characteristic regardless of change of environmental temperature, the low heat-generating temperature compensation device comprising:

5 a temperature sensor that detects a temperature at which the optical communication device is used;

 a temperature comparison unit that generates a digital error value which represents the difference between a signal corresponding to the detected temperature and a signal corresponding to a reference temperature of the optical communication device;

10 a temperature control unit that controls the temperature of the optical communication device on the basis of an analog temperature compensation signal;

 a D/A converter that converts a digital temperature compensation signal into the analog signal; and

 a digital PID control unit that receives the digital error value and performs PID
15 control using an digital method to generate the digital temperature compensation signal so as to urge the digital error value to zero.

10. The low heat-generating temperature compensation device according claim 9, wherein said two signals each comprise a voltage signal.

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11. The low heat-generating temperature compensation device according claim 9,
further comprising a high electric current drive unit for receiving the analog temperature
compensation signal from the D/A converter, amplifying the temperature compensation
signal and supplying the analog temperature compensation signal as high electric current to
5 the temperature control unit.

12. The low heat-generating temperature compensation device according to claim
11, wherein the high electric current drive unit consists of a pulse width modulation driver
and a current rectifier.
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13. A low heat-generating temperature compensation method that allows an optical
communication device to have a constant temperature characteristic regardless of change of
environmental temperature, the low heat-generating temperature compensation method
comprising the steps of:

15 detecting a temperature at which the optical communication device is used, and
performing digital signal processing of a signal corresponding to the detected temperature
and a signal corresponding to a reference temperature of the optical communication device
and then generating a digital error value which represents the difference between the two
signals;

20 D/A converting the digital error value of the temperature comparison unit into an
analog signal;

performing temperature compensation of the optical communication device in an

analog method on the basis of a temperature compensation signal; and

performing PID control using an analog method to generate the temperature compensation signal so as to urge the digital error value to zero.

5 14. The low heat-generating temperature compensation method according to claim 13, wherein the step of generating a digital error value consists of:

detecting a temperature at which the optical communication device is used and
calculating an error voltage value which is the difference between a voltage signal
corresponding to the detected temperature and a voltage signal corresponding to the
10 reference temperature of the optical communication device; and

A/D converting the error voltage value and performing digital signal processing of
the error voltage value.

15 15. The low heat-generating temperature compensation method according claim 13,
wherein said two signals each comprise a voltage signal.

16. The low heat-generating temperature compensation device according claim 13,
further comprising the steps of:

20 receiving the temperature compensation signal;
amplifying the temperature compensation signal; and
supplying, as high electric current, the temperature compensation signal upon

which basis the temperature compensation is performed.

17. The method of claim 16, wherein the amplifying and supplying steps are executed using pulse width modulation and current rectification.

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18. A low heat-generating temperature compensation method, which allows an optical communication device to have a constant temperature characteristic regardless of change of environmental temperature, the low heat-generating temperature compensation method comprising the steps of:

10 detecting a temperature at which the optical communication device is used and performing digital signal processing of a signal corresponding to the detected temperature and a signal corresponding to a reference temperature of the optical communication device and then generating a digital error value which represents the difference between the two signals;

15 A/D converting the error value of the temperature comparison unit into a digital signal;

performing temperature compensation of the optical communication device using an analog method on the basis of an analog temperature compensation signal;

D/A converting a digital temperature compensation signal to generate the analog
20 temperature compensation signal; and

performing PID control using a digital method to generate the digital temperature compensation signal in such a way that the digital error value is urged to zero.

19. The low heat-generating temperature compensation method according claim 18,
wherein said two signals each comprise a voltage signal.

5 20. The low heat-generating temperature compensation method according claim 18,
further comprising the steps of:

receiving the analog temperature compensation signal;

amplifying the analog temperature compensation signal; and

supplying, as high electric current, the analog temperature compensation signal

10 upon which basis the temperature compensation is performed.